

MARSH POND

2017 SAMPLING HIGHLIGHTS

Station – 2 Deep

New Durham, NH



Blue = Oligotrophic

Yellow = Mesotrophic

Red = Eutrophic

Gray = No Data

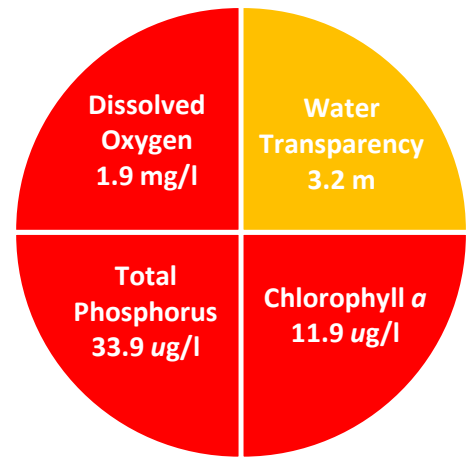


Figure 1. Marsh Pond Water Quality (2017)

Table 1. 2017 Marsh Pond Seasonal Averages and NH DES Aquatic Life Nutrient Criteria¹

Parameter	Oligotrophic	Mesotrophic	Eutrophic	Marsh Pond Average (range)	Marsh Pond Classification
Water Clarity (meters)	4.0 – 7.0	2.5 - 4.0	< 2.5	3.2 meters (2.5 – 4.3)	Mesotrophic
Chlorophyll <i>a</i> ¹ (ug/l)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	11.9 ug/l (6.9 – 30.5)	Eutrophic
Total Phosphorus ¹ (ug/l)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	33.9 ug/l (18.7 – 65.1)	Eutrophic
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	<2.0	* 1.9 mg/l (0.1 – 3.1)	* Eutrophic

* Marsh Pond developed a mid-lake layer of rapidly decreasing temperature and the August 18 oxygen profile was used to classify Marsh Pond.

Table 2. 2017 Marsh Pond Seasonal Average Accessory Water Quality Measurements

Parameter	Assessment Criteria					Marsh Pond Average (range)	Marsh Pond Classification
Color (color units)	< 10 uncolored	10 – 20 slightly colored	20 – 40 lightly tea colored	40 – 80 tea colored	> 80 highly colored	24.2 color units (range: 18.6 – 31.9)	Lightly tea colored
Alkalinity (mg/L)	< 0.0 acidified	0.1 – 2.0 extremely vulnerable	2.1 – 10 moderately vulnerable	10.1 – 25.0 low vulnerability	> 25.0 not vulnerable	7.6 mg/L (range: 6.0 – 8.5)	Moderately vulnerable
pH (std units)	< 5.5 suboptimal for successful growth and reproduction		6.5 – 9.0 optimal range for fish growth and reproduction			6.9 standard units (range: 6.6 – 7.2)	Optimal range for fish growth and reproduction
Specific Conductivity (uS/cm)	< 50 uS/cm Characteristic of minimally impacted NH lakes		50-100 uS/cm Lakes with some human influence	> 100 uS/cm Characteristic of lakes experiencing human disturbances		54.4 uS/cm (range: 44.7 – 60.9)	Characteristic of lakes with some human influence

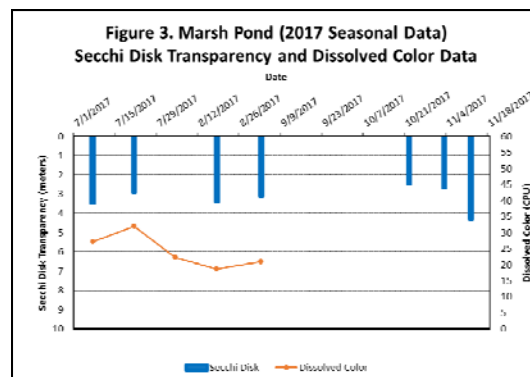
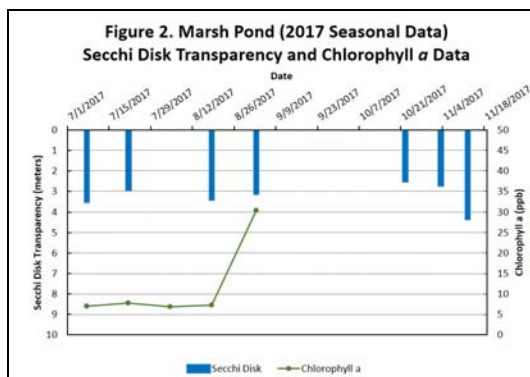


Figure 2 and 3. Seasonal Secchi disk transparency, chlorophyll *a* concentrations and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll *a* and dissolved color. Shallower water transparency measurements oftentimes correspond to increases in chlorophyll *a* and/or color concentrations.

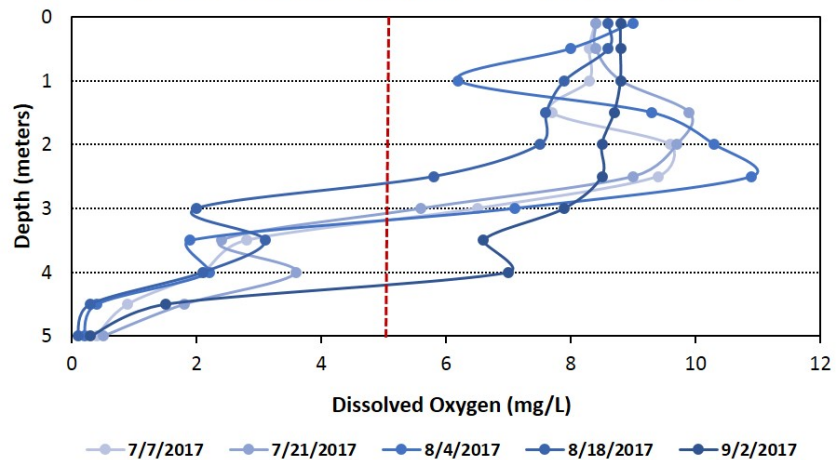
Table 3. Merrymeeting River watershed inter-lake comparison (2017 Data)

Lake	Average (range) Secchi Disk Transparency (meters)	Average (range) Chlorophyll <i>a</i> (ppb)	Average (range) Total Phosphorus (ppb)	Average (range) Dissolved Color (CPU)	Average (range) Dissolved Oxygen (mg/l)
Merrymeeting Lake	10.5 meters (range: 8.3 – 12.2)	1.0 <i>ug/l</i> (range: 0.4 – 2.0)	4.5 <i>ug/l</i> (range: 2.0 – 7.3)	5.5 CPU (range: 2.6 – 7.9)	11.2 mg/l (range: 10.0 – 11.8)
Marsh Pond	3.2 meters (range: 2.5 – 4.3)	11.9 <i>ug/l</i> (range: 6.9 – 30.5)	33.9 <i>ug/l</i> (range: 18.7 – 65.1)	24.2 CPU (range: 18.6 – 31.9)	1.9 mg/l (range: 0.1 – 3.1)
Jones Pond	3.3 meters (range: 2.7 – 3.8)	6.1 <i>ug/l</i> (single value)	21.7 <i>ug/l</i> (range: 18.7 – 25.8)	25.0 CPU (single value)	3.1 mg/l (range: 0.9 – 6.7)
Downing Pond	3.1 meters (range: 2.7 – 3.4)	5.3 <i>ug/l</i> (range: 3.8 – 6.8)	20.5 <i>ug/l</i> (range: 15.6 – 25.7)	31.5 CPU (range: 25.7 – 37.2)	-----

- Water quality data are reported for a deep reference sampling location in each lake/pond.
- Dissolved oxygen measurements were collected in the summer (late July and August) in the bottom water layer (hypolimnion or metalimnion).
- Downing Pond Secchi Disk transparency measurements intermittently reached the lake bottom before disappearing from view and likely underestimate the water transparency.
- ----- Indicates the site is too shallow to form a stable deep water layer (hypolimnion or metalimnion) during the summer months.

Figure 4. Marsh Pond dissolved oxygen profiles collected between July 7 and September 2, 2017. The vertical red line indicates the oxygen concentration commonly considered the threshold for successful growth and reproduction of cold water fish such as brook trout. Note: low dissolved oxygen concentrations near the lake bottom generally corresponded to elevated deep water total phosphorus concentrations. Cyanobacteria layers were documented in the metalimnion and may be associated with the dissolved oxygen spikes generally measured at a depth of 4.0 meters.

**Figure 4. Marsh Pond - Site 2 Deep
Dissolved Oxygen Profiles (July 7 to September 2, 2017)**



Recommendations

Implement Best Management Practices within the Marsh Pond watershed to minimize the adverse impacts of polluted runoff and erosion on Marsh Pond. Refer to “Landscaping at the Water’s Edge: An Ecological Approach” and “New Hampshire Homeowner’s Guide to Stormwater Management: Do-It-Yourself Stormwater Solutions for Your Home” for more information on how to reduce nutrient loading caused by overland run-off.

- http://extension.unh.edu/resources/files/Resource004159_Rep5940.pdf
- <http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-11-11.pdf>

Continue to work towards completing a Watershed Management Plan that will continue to assess water quality threats where future educational and remedial efforts should be focused.

Figure 5. Marsh Pond

New Durham, NH
2017 Deep water sampling site



Aerial Orthophoto Source: NH GRANIT
GPS Coordinates collected by the UNH Center for Freshwater Biology